EVANS (A.)

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A PAPER

READ BY APPOINTMENT,

BEFORE

THE COVINGTON MEDICAL SOCIETY,

JANUARY 3, 1853.

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ASBURY EVANS, M. D.

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To the Members
of the Covington Medical Society:

The following paper excited some debate when read, and was laid over for future discussion; it has, therefore, been printed, that each member may see precisely what it contains, and have the subject fresh in his mind when it is called up.

BRONCHOTOMY.

Mr. President:

I propose to-night to call the attention of the Society to the subject of Bronchotomy, so called from *bronchos*, the wind-pipe, and *teneo*, to cut. The operation, according to Galen, was first proposed by Asclepiades, and is, therefore, of great antiquity. It has been practiced ever since his time in some of the affections of the throat threatening suffocation. Of late years it has had a much more extended applicatien — only proportionate, however, to the broader and more exact views of modern physiology and pathology.

In bronchotomy either the larynx or trachea may be opened. Formerly the French and many of the English surgeons gave the preference to laryngotomy. Now, tracheotomy is more esteemed —although the former operation is still done by many surgeons. Fergusson, in one place, says it is scarcely possible to name an instance in which laryngotomy possesses any advantage over tracheotomy; but in another he remarks, that, where a foreign substance is lodged in the larynx, or on account of the shortness of the neck, as in an infant, the crico-thyroid membrane should be divided. (Fergusson, p. 433.)

Liston, in his Practical Surgery, says: "The existence of a foreign substance being clearly ascertained, an opening must be made into the *trachea*;" and further, "If fixed in the larynx, entangled in the rima, or lodged in one of the ventricles, the foreign body can be felt by the introduction of an instrument upwards; it can then be seized, or it can be displaced, either upwards into the fauces, or brought down through the opening in the neck." And again he repeats, "Under all circumstances, tracheotomy is to be preferred to laryngotomy."

But Liston was not always impartial in judging of surgical proceedings. He was often a partisan in the advocacy of his pet operation. Bichat thought laryngotomy always answered as well tracheotomy, and in some cases better. Samuel Cooper (Surgery, vol. II, p. 30) thinks laryngotomy evidently preferable if the substance is lodged between the edges of the glottis, or in the ventricles. He relates a case which was in the *Hotel Dieu*, under Ferrand. A stone had fallen into the glottis; tracheotomy was performed, but only a little blood and mucus escaped. The patient

died, and a triangular piece of stone was found, with two angles fastened in the ventricles of the larynx, while the other projected at the glottis. "In this case," says Cooper, "laryngotomy would have saved the man's life." He condemns this operation except in cases of foreign bodies in the air-passages. For the removal of a bur, lodged in the larynx, Prof. Mussey performed laryngotomy, the only method which would have succeeded; for, after "the cricoid cartilage and the circo-thyroid membrane were divided, repeated attempts to introduce an instrument caused, in a moment, convulsive coughing. The thyroid cartilage was then slit up almost to its upper edge. The finger was then introduced, and the bur was dug from its bed in the ventricle of Morgani, and pushed up through the chink of the glottis." An opening in the trachea would not have admitted of this new proceeding.

The operation has, also, been frequently done with success in diseases of the larynx. A case of acute laryngitis, under the care of Dr. Latham, is related in the 2d vol. London Lancet, p. 317, in which Mr. Earle performed laryngotomy with the effect of curing the patient.

The present practice of the best surgeons is to perform tracheotomy instead of the higher operation, except under the circumstances mentioned by Fergusson. After some reading and reflection on this subject, I think there are many cases in which one will answer as well as the other; while in many, laryngotomy should be chosen; and in others tracheotomy.

Fewer accidents are liable to occur in performing laryngotomy than in the other operation. One of the casualties which may happen is the division of a vessel of the superior thyroid artery (crico-thyroid) which runs across the membrane, and is occasionally of such size as might cause trouble when cut. Prof. Turner, of Edinburgh, used to relate, in his lectures, a case where in such an operation a child bled to death from a wound of this vessel. This operation is also more easily performed than the other, and is thus done: An incision, an inch in length, is made in the mesial line, extending from the pomum Adami to the first ring of the trachea, which exposes the crico-thyroid membrane, almost immediately under the integuments. The knife is then thrust with a slight jerk, through the membrane, and an incision of sufficient length is made. If enough room is not thus obtained, another incision at right angles to the first must be made. Should this not afford ample space, the knife must be carried upwards or downwards—if up, through the thyroid cartilage, care must be taken to keep the knife precisely in the median line, otherwise the vocal cords may be divided; no serious harm can result if carried downward, but the aperture made in the cricoid cartilage will not, on

account of the elasticity of this ring, gape like that made in the other parts.

Tracheotomy is the more difficult and dangerous operation, for these reasons: The trachea lies deeper in the neck than the larynx; the parts over it may be much swollen, and even inflamed; oftentimes the patient is unsteady, throwing himself about, and gasping for air—the laborious efforts to inflate the lungs causing the trachea to sink down behind the sternum; the carotid artery has been wounded—and in some subjects, the arteria innominati is in danger—since Burns has seen it rise as high as the border of the thyroid gland; the isthmus of the thyroid is often in the way, but unless greatly enlarged may be pushed upward out of danger; and Fergusson says, it may, if necessary, be cut into without much fear of hemorrhage; the lobes of the gland are, also, in danger sometimes. Nevertheless a skillful man—who has coolness and judgment, and will cautiously feel his way, rather than rush upon hidden danger—can always perform the operation without serious accidents.

It is thus performed: The trachea is steadied by holding the thyroid cartilage between the thumb and finger of the left hand; with a scalpel the skin and superficial fascia are divided exactly in the mesial line from the cricoid cartilage to the top of the sternum; the sterno-thyroid muscles are then pulled aside; the wound is cleared of blood, and the finger and handle of the knife are used to determine whether or not there is any irregular distribution of arteries, that if there is they may be avoided; enlarged veins if present must be pushed aside; the fascia of the trachea must then be cut away; the isthmus of the thyroid gland pushed upward if necessary; and then with a sort of jerk the sharp point of a knife is made to penetrate the tube at the lower part of the wound, and the opening is enlarged either with that or a probe-pointed bistoury—cutting from below upward.

Tracheotomy should be done:

1st. When a tumor presses upon the larynx, threatens suffocation, and cannot at the present, or perhaps at any future time, be extirpated. Such cases must be extremely rare: one such, however, is on record.

2nd. In some cases of injury to the forepart of the neck. Mr. Liston (Pract. Surg. p 269) says "a little girl fell, in running across the street, and struck the larynx with great force on a large stone. She was almost moribund when seen shortly after: the trachea was opened, respiration established, and a complete cure effected. It was found necessary to retain the tube in the wound for eight days, until the swelling had subsided, and the functions of the muscles of the larynx had been restored."

3d. The operation was resorted to with admirable presence of mind by Trousseau (I think) within a year or two, when, upon the removal of the lower jaw spasmodic action of the muscles of the tongue suddenly threw that organ back upon the glottis. Respiration ceased—the eyes projected, the blood vessels of the neck and face became distended, the assistants exclaimed "he is dead," and the briefest hesitation on the part of the surgeon would have been fatal to the patient. He at once opened the trachea—and all danger instantly passed away. Petit relates two cases of children killed by this mal-position of the tongue—in consequence of cutting the frenum too far. Tracheotomy would probably have saved them.

4th. The operation has been recommended and practiced in cases in which the tongue has been so much enlarged as to fill up the passage through the fauces. This practice has been objected to upon the ground that scarifications of the organ will afford relief, and I believe most modern authors advise this as the only surgical treatment. I have seen but one case of dangerous glossitis: About a year ago a little son of Capt. Field--then of this city--was attacked with inflammation of the external glands of the neck and throat: he was purged and leeched; the next day his tongue became inflamed. The swelling was extremely rapid, and threatened suffocation. Long and deep scarifications were made—and repeated time and again; nevertheless, several days passed by before he was removed from danger. During two nights I feared I should have to open the trachea. Had the disease proved only a little more rebellious, I feel assured that tracheotomy alone could have saved him. I can, therefore, believe that it has been and may yet be necessary to do this operation in some cases of glossitis.

Mr. Ben Bell once performed the operation in a case when the patient had taken, in a very short time, so large a quantity of mercury that the tongue become alarmingly swollen in a few hours. All the usual means were tried, but in vain. The operation was delayed until the patient was nearly suffocated. He was restored as soon as an opening was made into the trachea.

5th. Bronchotomy has been advised when both tonsils are so much enlarged as very dangerously to impede respiration. (Cooper Surg. Dict.)

Acute affections of these glands sometimes appear to threaten death to the patient, but in those cases scarifications of the parts, with other means, will always, in my opinion, relieve the patient, so much that the trachea need not be opened. In chronic enlargements, excision is the proper method of treatment--and except in the rarest instances will succeed.

I once saw a young woman who had chronic disease of the ton-

sils to such an extent as to change her voice, and make her snoring very disagreeable to any one who had the misfortune to be near her in her sleep. She got a slight catarrh—which somewhat increased the swelling, and seemed likely to prove fatal. I bled her at the arm, and gave relief. Two days afterwards I excised the tonsils. Had venesection failed to relieve her, tracheotomy would have been the only means of saving her life. Whether in acute or chronic cases, if suffocation is impending, and, other means fail, as it is said they have, the trachea should be opened without delay.

A boy was taken to the Middlesex Hospital on account of great dyspnœa, and a hissing respiration, produced, apparently, by two enormous tonsils. With great difficulty a large part of one was cut off with scissors. After the operation (either from fresh swelling, or pressure made by the remaining one, which grew downward) his difficulty of breathing became extreme, and it was thought advisable to perform tracheotomy, which gave signal relief. At length the other tonsil was removed, and the boy recovered.

6th. Bronchotomy is often necessary when a foreign body gets into the air-passages. This accident is of frequent occurrence, although *a-priori* one would suppose it impossible, that a body of considerable size could intrude itself into the windpipe. Watson (p 656) enumerates as these intruders: "Morsels of food; the stones of fruit; teeth; portions of bone; pebbles; pieces of money; nuts; nut-shells; buttons; ears of grass or corn; a musket ball; a large shot; a fragment of nutmeg; iron nails; kidney beans." I have seen three cases: in two, beans were the offenders; in the other, a piece of parched corn. I have known of two cases of the presence of *cockle burs*, and a third is related by Professor Mussey in the III volume Trans. Am. Med. Ass. He also mentions that a surgeon once showed him the ring of a watch chain which he had taken from the trachea of a child after death. I have a traditional knowledge of a case where a grain of corn was removed from the trachea of a boy in Bullitt county in this State, more than thirty years ago. The operation was done by Dr. Oldham of that county —who, after reaching the house, rode, under the excuse of going to sharpen his instruments, to a town two miles off, to get a glass of whisky—it could hardly have been "Old Bourbon" so long ago.— It shows the gratitude of the father and the currency of the times that he gave the doctor a fine horse, saddle and bridle for saving his son.

The accident always occurs during forcible inspiration, when the glottis is at its greatest width. Once fixed in the chink of the glottis, a body even of considerable size may be driven downward by the pressure of the air seeking, as the chest expands, to fill the

lungs, and avoid that abhorrence of nature—a vacuum. Watson illustrates this by mentioning the fact that when an empty bottle with a well-fitting cork is sunk into deep water, the cork is forced into the bottle by the pressure of the super-imposed water.—No such powerful force can in most cases be called into action to expel the substance.

It sometimes occurs, nevertheless, that the powers of nature are sufficient to rid the air-passages of their disagreeable tenants. In the case under my care, of a boy who had got a piece of parched corn in the trachea, or perhaps in the right bronchus, the foreign substance, in a moment of violent coughing, was forcibly ejected. When first seen, he had fever, a loose cough, with large mucus rale, indicating bronchitis, which I supposed had its origin in the condition of the weather—it being cold and damp. Treatment appropriate to the disease thus produced was resorted to. The fever disappeared and the patient was much improved—still the cough continued, and I could not understand wherefore. At length, when the disease seemed to be totally unamenable to treatment, I was delighted at a morning visit to be shown by his mother the husk of a piece of corn, which he had expectorated during the night. All the symptoms speedily left him. Cooper (Surgical Dict., p. 203) says: "As a monk was swallowing a cherry, the stone of the fruit passed into the trachea. A violent cough ensued, and excessive efforts, as it were to vomit, were the first symptoms of the accident; and of these the patient thought he should have died. A sleep of some hours followed this terrible agitation, and the patient afterwards did not feel the least inconvenience during a whole year.—At the end of this time, he was attacked by a cough, attended with fever. At length the patient evacuated a stone as large as a nutmeg. It was externally composed of tartareous matter, to which the cherry-stone had served as a nucleus. A copious purulent expectoration followed the discharge of the foreign body, and the patient died consumptive some time afterwards."

Colles (*Lectures on Surgery*, p. 104) relates the following case: a child had a pop-gun made of a quill with which he used to shoot pellets of raw potato; he had this quill in his mouth; something made him laugh, and down went the quill into the trachea. When Colles arrived the difficulty of breathing had almost ceased, and the child's mother, a thrifty Scotchwoman, would, therefore, have nothing to do with the doctor. All the bad symptoms, however, returned—and again disappeared. The child was excited by something to laugh, and out popped the quill; and what was remarkable, the bit of raw potato which was in it when it went down was not in it when it came up.

Watson was once taken by a professional friend to see a child

into whose trachea a tack was thought to have passed. When he saw the child nothing appeared to be the matter with him; but he had been subject ever since the accident to violent paroxysms of choking cough, alarming his parents and attendants for his life. The question was much discussed what ought to be done? Nothing, however, was done, and at the end of several weeks the nail was coughed up.

Such fortunate results are extremely rare. The glottis, which is expanded during inspiration, is narrowed in the act of expiration.

The presence of these bodies in the air-passages is always an alarming and dangerous fact, and if they are not removed a fatal termination must sooner or later ensue.

Should they not be expelled by coughing, bronchotomy must be practiced—and the sooner this is done the better for the patient. It is idle to try errhines, emetics and the like—which I have seen done, without the slightest chance of benefit to the child, but at the expense of its comfort and strength.

The foreign body may, by completely closing the glottis, produce instant death, by apnœa.

Passing through the chink, it may occupy one of several different positions in the air-passages—or may, indeed, be, at different times, in all these places.

The symptoms of its presence will vary with its position. Getting into the lungs—and these bodies are apt to pass particularly into the *right* lung—it would be liable to excite inflammation ending in abscess, and thereby occasion death. Were the patient predisposed to phthisis, it would probably hasten the deposition of tubercular matter; and many persons do die, after this accident, with symptoms of chronic phthisis.

Should the substance not go down into the lungs, it may become entangled in the ventricles of the larynx, or between the chordæ vocales. In the case reported by Prof. Mussey, and before referred to, the *bur* was lodged in the ventricle of Morgani. When in this part of the wind-pipe severe laryngæl symptoms, as a violent spasmodic gasping cough, pain in the larynx, croupy respiration, and a sensation of choking, speedily supervene, and continue, with little, if any abatement, until it is expelled from its seat, or the patient is relieved by death. When dislodged it may pass downward into the lungs, and as already stated, give rise to symptoms of consumption. There is, however, a case on record where a piece of gold was entangled in the larynx for years, without giving rise to these distressing symptoms.

Having passed the upper part of the larynx, it may be stopped again at the cricoid cartilage, or pass on into the trachea. Here

it may give rise to comparatively little inconvenience, if it is smooth, and does not block up the canal. A wheezing or croupy sound during one or both acts of respiration; and pain in the part are sometimes the only symptoms of its presence. Prof. McNamara relates the following instance which shows what journeys one of these bodies may take in the air tubes. "A boy had made a whistle by perforating a plum-stone, and extracting the kernel. This, during a strong inspiration, passed from between his lips, through the glottis, and became fixed transversely in the larynx. So little inconvenience did this create, that the boy, finding that he still whistled as he breathed, went about for some hours, pleased to display this accomplishment. For three days he continued to exercise his childish amusements, suffering now and then a seizure of suffocating cough. He was then taken to the Meath Hospital. He had no pain in deglutition; but he said when the cough was severe it caused pain in the throat. He had also uneasiness in the epigastrium, a bloated countenance, and a frequent pulse. The chest sounded well on percussion, and the vesicular murmur was natural. The fits of coughing were followed by white frothy expectoration. Laryngotomy was performed; but during the struggle and the convulsive coughing which took place when the opening was made, the stone (so the patient declared) was coughed up and swallowed. The symptoms were relieved—and the whistling ceased. But it was found that, as the wound healed the distress and the whistling sound returned, which showed that the stone laid above the opening; and that the disappearance of the symptoms had been owing, not to its dislodgment, but to the admission of air below the point where it was fixed. Soon after this, however, it changed its place, passed down into the bronchus, and then up again towards the larynx. By a second operation it was extracted; and the lad recovered without any bad symptoms." *Watson's Lectures*, *p* 658.

Finally, then, the substance may, as before stated, play about from place to place—being now in the bronchus, next in the trachea, and again in the larynx among the chordæ vocales.

Wherever it may be it will produce peculiar symptoms. If entangled in the ventricles of the larynx, croupal respiration, spasmodic cough, loss of voice, and sensation of choking will point out its location. Playing freely in the trachea, the wheezing in one or the other or both acts of respiration, pain in the part, and its striking against the narrowed part when the tube is pressed between the thumb and finger will indicate its place. In the bronchus it will give rise to phenomena no less peculiar: Thus, if it be large enough,—and Dr. Stokes says, particularly if it be round and smooth so as to accurately fit the tube—we will find the vesicular murmur absent, or very feeble, while the lung emits

a resonant sound under percussion. Subsequently it will excite inflammation, and produce the symptoms and signs of inflammation of the lung. Another symptom of a foreign body in the air-passages is emphysema above the clavicles. In a case seen in 1759, by Louis, and detailed by him with great minuteness, this symptom was present. Upon dissection he found "the substance of the lungs and mediastinum emphysematous: The air confined by the foreign body had, during the violent fits of coughing, ruptured the air cells, and insinuated itself into the interlobular cellular substance; thence it passed into the cellular substance of the lungs; next into that connecting the lungs and pleura. By the inter-communication of these cells it produced a prodigious swelling of the cellular substance between the two layers of the mediastinum. The emphysema in its progress at length made its appearance above the clavicles." The other surgeons—who had not at any period understood the case—supposed the swelling arose from rupture of the trachea. (*Cooper's Dict. p.* 203.)

The diagnosis is not, however, always easily made, and especially in children. The history of the case often throws much light upon it. A patient while eating is suddenly affected by symptoms of suffocation—he has had no disease, and has none now—the inference, then, is irresistible that the food has in some way obstructed the air-passages. This can be done in but two ways: 1st, by pressure from behind upon the trachea, the substance having lodged in the œsophagus; or, 2nd, by its having passed into the wind-pipe. A probang of sufficient size will determine its presence in the gullet. Symptoms continuing after exploration with the probang indicate the locality of the foreign body to be in the air-passages. But the history is frequently incomplete: then much caution must be observed. The respiratory organs should be diligently and skillfully examined before making up an opinion. With care, however, and a knowledge of the functions of the various parts of the breath-machine, and consequently of how these must be disturbed by the presence of this or that body in this or that part of them, will lead to a correct conclusion. It is for this accident that the question is chiefly raised whether laryngotomy or tracheotomy should be performed: If the body be in the rima, or ventricles, or anywhere in the larynx—laryngotomy is the better operation. The substance may then be pushed upward, or pulled out at the opening. If it be in any other part of the air tubes, tracheotomy should be done. When lying loose in the trachea it will often escape through the aperture, as soon as one is made—and sometimes will be thrown by the rush of air to the distance of a foot or more: if this does not occur, it can be removed with a bent probe, or a pair of forceps, or with a probang be pushed through the chink

of the glottis. There are, however, numerous instances where after the operation, these aliens could not be removed. In 1843, Mr. Brunel, the celebrated engineer, while amusing some children with tricks of legerdemain, put a half-sovereign into his mouth, and the piece slipped into the glottis. It occasioned no great distress. After more than three weeks the trachea was opened by Sir Ben Brodie—but the money still remained in its vault. Mr. Brunel placed himself with his head downward, hoping that gravitation might assist in the removal of the coin; and at the end of six weeks he was rewarded for his perseverance by the escape of the money. The piece probably lay edgewise in the wind-pipe, and hence could not be driven up by the air. This likewise was the reason why it did not excite coughing and difficult respiration.

The septum which divides the trachea into the bronchi is placed towards the left side; and the *right* bronchus is more vertical, and of larger diameter than the *left;* hence when a foreign body passes into the lungs it is much more apt to go into the right than the left bronchus. This should always be borne in mind in making out a diagnosis. When thus located, the difficulty of removing it is very great. Liston, in his Practical Surgery, says: "Only one case, it is believed, is on record in which a foreign body was actually removed (he means of course by surgical operation) from the bronchus." The patient, a female, aged 37, had, at least six months previously, got a piece of mutton bone entangled in the glottis. By a great effort in a fit of threatened suffocation, she succeeded in dislodging it, but it passed downward into the trachea, and finally lodged permanently under the right sterno-clavicular articulation. Bronchitis supervened, and was several times renewed. From one of these attacks she had just recovered when Liston saw her. The history was clear; inspiration was somewhat noisy, and there was some degree of peculiar sonorous rale perceived upon applying the ear to the chest at the point described as where the foreign body had become fixed. The trachea was opened; a pair of forceps, opening latterly, was introduced; a hard substance could be felt but not grasped; another pair differently arranged, was passed at least three or three and a half inches down the tube, and the bone was immediately seized and removed. The patient recovered.

Another case is related in the London Lancet, February, 1842, (after Liston's book was published.)

The trachea was cut, the finger introduced, cough excited and a cherry-stone was ejected from the bronchus through the opening in the neck. It is a German case and not given in much detail.

7th. Bronchotomy has been proposed in cases where foreign bodies in the pharynx or œsophagus press upon the wind-pipe, so as to hinder respiration, and at the same time cannot be immediately dis-

lodged from their place. Such cases must undoubtedly be rare. Mr. Ben. Bell, however, mentions two instances of suffocation from this accident. The usual means for their removal were used. Had tracheotomy been done, the result would, probably, have been different.

Habicot successfully performed this operation on a lad fourteen years of age, who, having heard that gold, when swallowed, did no harm, attempted to swallow nine pistoles, wrapped up in a piece of cloth, in order to hide them from thieves. The packet, which was very large, could not pass the narrow part of the pharynx; and here it lodged, so that it could neither be extracted nor forced down into the stomach. The boy was on the point of being suffocated by the pressure which the foreign body made on the trachea; and his neck and face were so swollen and black, that he could not have been known. Habicot, to whose house he was taken, attempted in vain, by different means, to dislodge the body. At length, perceiving the patient in evident danger of suffocation, he resolved to perform tracheotomy. The operation was no sooner done than the swelling and lividity of the face and neck disappeared. Habicot pushed the pieces of gold down into the stomach with a leaden probe, and the pistoles were, at different times, discharged by the anus, eight or ten days afterwards. The wound of the trachea soon healed.—(Cooper's Dict., Art. Bronchotomy.)

8th. Children, sometimes for the purpose of drinking, apply their mouths to the spout of a tea-kettle containing boiling water. It would be supposed, *a priori*, that when a child thus inadvertently drinks boiling water, the mouth, pharynx and œsophagus would be the parts upon which the injury would chiefly fall. Observation has shown that this is not, at least generally, the fact. When death occurs from this kind of accident it almost always, if not constantly, arises from obstructed respiration. The symptoms are those of inflammation of the glottis and larynx—resembling those of croup. Before a surgical operation is resorted to, the same treatment, except emetics, which is useful in croup should be employed.

If the age and vascular condition of the patient are such as will admit it, venesection should be practiced; and whether general blood-letting is employed or not, leeches should be applied to the neck in such numbers as the age and strength of the child may require. Mercury in large doses, so as to bring the system under its influence with as little loss of time as possible, must be administered. The quantity of this medicine which will be borne, and is actually demanded by the urgency of the case, is larger than might be supposed. In the only case of this accident which has come under my notice, I at once gave ten grains of calomel; that night,

ten more; the next day ten; on the third, three grains of *hyd c cre. ta;* on the sixth, three more; on the tenth, one; the twelfth, three; and on the thirteenth, one grain of calomel. Neither salivation, nor much purging occurred.

Should the symptoms become aggravated, or even proceed without abatement, after the treatment above indicated, tracheotomy is our only expedient for safety.

Tracheotomy in these cases was first proposed by Dr. Wm. Wallace, of Dublin, in the year 1822. Eleven years afterwards he had seen twelve cases of scald of the glottis; and, says, notwithstanding the frequency of the accident, no one, so far as he was aware, had referred to it in any surgical writings, until after he had recommended bronchotomy for its relief. He further states it is an erroneous supposition that large blisters are formed in the wind-pipe. This is impossible in mucous membranes: the epithelium is much thinner than the cuticle, and ruptures before much accumulation takes place. "The obstruction to breathing, and consequently the danger, do not arise from the presence of either large or small vesications, so much as from œdema and sub-mucus effusion—the result of the inflammatory action which quickly supervenes." This he has verified by dissection. Alarming symptoms do not generally occur for some hours after the patient has attempted to swallow the water—not, in other words, until inflammation has been set up, and caused effusion beneath the membrane.

Dr. Wallace is a decided advocate for blood-letting, and the free use of calomel, and, if they fail, the prompt performance of tracheotomy. See *London Lancet, for* 1833, p. 659 et seq.

I was called, February 5th, 1850, about 4 o'clock P. M., to see a negro child aged two years. He had, at 11 o'clock that morning, applied his mouth to the spout of a tea-kettle containing boiling water. I found him with a hot and dry skin, rapid pulse, throbbing of the carotid arteries, veins of the neck distended, eyes prominent and watery—the whole expression was one of extreme anxiety, and the respiration was croupy and exceedingly laborious. I had him freely leeched, gave him ten grains of calomel; called a consultation and proposed tracheothmy, which was objected to. I waited an hour or two, at which time the symptoms had become aggravated, and clearly indicated that death was near at hand. Further delay, it appeared to me, would be criminal, and I determined to operate. Assisted by Dr. Semple, Col. Sep. Wall, and an old negro woman, who held a candle for us, I made an external incision an inch and a half long, extending from the top of the sternum upward. The neck was deep, and the bleeding profuse, although no vessel needing ligature or torsion was cut. When this was controlled by pressure, I opened the trachea, and Dr. Semple skillfully passed a

curved silver canula into the opening, the lips of the wound being held apart with a pair of forceps by Dr. Holt, who had come in. The relief was astonishing. No sooner was the tube in than the child began to breathe so gently, that our colored friend exclaimed "he is dead." He almost instantly fell asleep.

Without this operation the child would have died before medicine could have affected him: but it was necessary to give this for many days afterwards to subdue the inflammatory action. The boy is now well. *Western Lancet, Vol. XI, April*, 1850.

9th. In œdema of the glottis from whatever cause arising, tracheotomy must be employed unless the method of Dr. Buck of New York shall be found sufficient. He has met the most cheering success in this disease by making scarifications in the epiglottis and edges of the glottis. A distinction has properly been made between œdema of the glottis and laryngitis. Watson, in his Lectures, (p. 500,) says: "the main practical difference between œdema glottidis and acute laryngitis is this: that in the former, there being no fever or inflammation, blood-letting is not requisite and the operation of tracheotomy becomes the sole recourse to which, in the extremity of danger, we can look for help."

Dr. Williams (*Tweedie's Library*) remarks that "the attacks of difficult breathing are sudden and rather severe at first, and may prove suddenly fatal; or they may subside for awhile after the expectoration of a little glairy mucus, and recur again with increased severity; in the interval the breathing being pretty free, but the voice still hoarse, and the sensation of a tightness or lump in the throat remaining."

10th. Tracheotomy should often be resorted in the treatment of acute laryngitis. This is a most dangerous and rapid disease; in many cases giving rise to symptoms of suffocation so speedily that remedies have not sufficient time to act. Copious venesection, leeching, and the administration of mercury in such a way as to rapidly affect the constitution are the first means of treatment. But it is often necessary to allay the violent spasmodic condition of the upper part of the wind-pipe before the full effects of these remedies can be induced—otherwise the patient will suffocate. Through an opening in the trachea respiration is carried on without calling in play the highly irritable and inflamed portal of the lungs.

I cannot resist the temptation of quoting the following graphic picture of the disease. It is from Dr. Latham's work on "Auscultation and Semeiology." "I have seen," he remarks, "a man, young, full of flesh, and with the form and plumpness of health, laid out dead. And I have scrutinized all his organs thoroughly and carefully; and all were healthy and perfect, save the margin of that lit-

tle chink which conducts to the larynx. And here there was a slight swelling, partly of the membrane which invests it, and partly of the cellular substance beneath; but there was no ulceration, no breach of surface.

"And could *this* occasion death? Why, there was hardly a perceptible narrowing of the passage. And could this, I say, produce death? Yes! indeed could it. Truly this little swelling is a mighty disease. In two short days it had subdued and annihilated this very man. Not all the force of remedies, or all the vigor of his own frame, could save him. I had seen him with all his might fighting for breath, but in vain, for he died strangled. * * *

"Why did the little lymph and serum *here* effused become a fatal mischief? The corpse did not, and could not tell us. For anything it disclosed, he might still have lived; for after death the glottis was open, and air was made to pass freely through it to the lungs.

"But what the corpse could not teach the acting and suffering of the living man declared intelligibly enough. He spoke, and coughed, and breathed hardly and convulsively, and in an agony, and with a loud scream, or croupy noise; and he could not swallow. At length, voice, and cough, and breath, were all suppressed, and he died.

"After death the glottis was open: but what was its state during life? Unquestionably it was greatly narrowed, or nearly closed; all that the patient did or suffered gave proof of the fact.

"But what *can* narrow the glottis, if it be not narrowed mechanically? Surely nothing but the *vital* action of its muscles. Behold, then, the whole pathology of the disease! Those tiny muscles, which move the arytenoid cartilages and the vocal cords, could not bear the contiguity of the disease of the mucous membranes. It irritated them into a mighty spasm, which no effort of the will, no struggle of the whole body, could arrest or control; and acting, beyond their natural sphere, they dragged into a forced approximation every part which they could move, and nearly closed the glottis."

Dr. Cheyne considered laryngitis the most fatal of all the inflammations. Bayle saw seventeen cases, of whom but one recovered. "It has numbered some distinguished medical men among its victims." The Empress Josephine died of it, and it proved fatal to "him who was first in war, first in peace, and first in the hearts of his countrymen."

The venerable Dr. Francis, of New York, suffered with the disease, but was cured by copious bloodletting. The rector of Christ's Church, in our city, Rev. Wm. Newton, suffered an attack of it in 1844. He was under my care. I bled him largely at the arm, and rapidly brought him under the influence of mercury.

So little reliance has Mr. Lawrence on ordinary means in this disease, that he says the wind-pipe should be opened, "as soon as the symptoms enable us to determine the nature of the disease." And the French Surgeon, Louis, observes: "As long as bronchotomy is made a *dernier resort*, it will always be performed too late." Dr. Baillie thought it ought to be done at the end of thirty hours. Unluckily for this opinion, some die in twelve hours. Dr. Cheyne lays down this rule—a good one: "If the symptoms be such as to contra-indicate bleeding, and yet asphyxia is imminent, *thirty minutes* delay may be too much; but if the complexion is good, and asphyxia not threatened, the operation may be delayed *thirty days*." And Watson remarks, "that in his own case, he should choose to be operated on early—the moment he found early blood-letting was not *telling* upon the local distress, and that any shade of duskiness became perceptible in the skin." The best authorities are, then, in favor of early resort to the knife in this disease, unless remedies are already making a favorable impression.

On the other hand, the operation ought, perhaps, never to be refused because it appears to be *too late*. Here is the description of a case incidentally mentioned several pages before: "What a frightful picture she was! Cold, and livid, and pulseless; her eyes starting from their sockets; her mouth wide open, and lips, and tongue, and teeth black with sordes; and breathing convulsively, and with a sort of scream. With what agony she struggled for life, and what force she used to preserve it! Tossing about her arms, striking aside all who came near, for they kept the air from her; and dashing away a cup of water that was offered, for she knew a single drop would suffocate her." (*Latham's Aus. and Semeiol.*) Mr. Earle opened the wind-pipe, and she recovered.

I quote another case from Watson: "The seizure was so sudden and rapid, that, although Mr. Arnott was luckily in the hospital at the time, the woman was, to all appearances, dead, before he could be found and brought to her bedside. Respiration had entirely ceased. This quietude of the larynx rendered the operation more easy. Mr. Arnott speedily made an opening into the trachea; some air was blown in through the aperture, and then pressed out again; and presently the natural respiration was renewed. The woman recovered." (*p.* 496, *Lectures.*)

11th. For *ulceration of the larynx* it sometimes becomes necessary to open the trachea. In some cases this is done to put the diseased parts at rest until remedies can have time to restore them; and especially to admit of the more easy application of remedies to the ulcers. Such proceeding is justified only when the disease is local. In most instances this is not the case: the disease being

only an offshoot of general tuberculization, or the root from which tuberculization has sprouted.

If, however, the lungs are sound—there is harrassing laryngeal cough, progressive emaciation, expectoration of pus often streaked with blood, pain in the larynx, loss of voice, difficult deglutition, hectic and night sweats—the disease may safely be referred to the larynx. Touching the part with the finger, if ulceration has extended deeply, will often betray the nature of the case.

Should acute inflammation or œdema suddenly occur, the knife, of course, must be applied.

12th. Bronchotomy has been successfully practised for the removal of polypus growths in the larynx. In *Ranking's Abstract, vol. 14. p.* 109, a case is related which occurred in the practice of Prof. Ehrman, of Strasburg:

The patient, Caroline M———, aged 33, and the mother of two children, first observed, in the autumn of 1840, a slight change in her voice, which became hoarse and rough. This change was attended by no pain, or difficulty in articulation or respiration. Subsequently there was nearly total aphonia, which was worst towards the termination of two pregnancies; it diminished after delivery. After some time, quick respiration came to be accompanied by the sound of a valve alternately opening and shutting; and occasionally, during deglutition, some drops of fluid entered the larynx and excited violent coughing. During these attacks of coughing, she sometimes expectorated portions of tissue, similar, as was afterwards found, to the growth in the larynx. Still later, a sudden attack of dyspnœa came on, lasted a short time, recurred repeatedly with violence, and was instantly induced by the slightest cough or effort to vomit. Prof. Ehrman immediately proposed bronchotomy, but it was delayed nearly two hours at the urgent solicitation of her friends.

The crico-thyroid membrane, the cricoid cartilage, and the first two rings of the trachea were divided, and a tube was introduced, with immediate relief to the patient. At the end of forty-eight hours an incision was made from opposite the oshyoides downward, in the mesial line, to join the former incision. The larynx was then slit up, and the cavity freed of the blood which had accumulated in it during the operation; then the polypus was seen, attached to the left inferior ligament of the glottis, seized by a pair of forceps, and excised at its base. The tube, which was left in the trachea during the last operation, was not removed until two days after. At the end of twenty-one days the wound was healed, and the patient made a perfect recovery, with the exception of the loss of voice.

Watson relates a fatal case, in which no operation was attempted: indeed, the diagnosis was not well made out.

13. In Braithwaite's Retrospect, (part 24, p. 323,) is related an interesting case of *Epithelial cancer* affecting the pharynx and larynx, in which tracheotomy was done, with the effect of prolonging life four months. A woman in Guy's Hospital had great difficulty in swallowing, dyspnœa, pain in the throat, and failure of voice. She rapidly grew worse. Emaciation was so great that enemas of cod liver oil were given—but these had to be quit on account of an attack of piles. Suffocation was threatened: the trachea was opened, and a tube inserted. From this time she rapidly improved. Caustic applications were made to the parts to arrest the disease. After a time she began to gain flesh, and was able to be up for an hour or so. But at the end of a month she again began to decline, and, four months after the operation died of the disease.

14th. Tracheotomy has been employed in the treatment of croup from an ancient period. Its utility has always been much debated —and a few years ago it was generally rejected. Of late years the operation has been brought into greater favor, especially by the labors of Trousseau. This surgeon, in a series of papers published in 1851, states he had then performed tracheotomy altogether 169 times; (11 for chronic disease of the larynx, and 158 for croup;) and that 43 of these cases, or a little more than one fourth recovered. Among his last 18 cases, however, there were 8 recoveries, or nearly one half. At the *Hospital des Enfans* the result has latterly been equally gratifying; for of 19 cases operated upon between January and August, 1851, one-half recovered; and M. Geursant has been as successful in his private practice. M. Trousseau believes these favorable results are due to the fact that, the principles of treatment in these cases are better understood than formerly:—the children are brought to the Hospital sooner, before the vital powers have been lowered by leeching and blistering, heretofore so common. He has, moreover, modified his subsequent treatment; for he now does not apply to the trachea and bronchiœ a strong solution of nitrate of silver, which he formerly insisted upon as essential. He, also, now uses a double canula, the inner of which can be removed and cleansed without displacing the other.

Dr. Scoutetten performed the operation on his own child, aged only three weeks,—on the third day of the disease, and under circumstances apparently the most unfavorable. The child got well.

Many years ago, Mr. Andre succeeded in curing a case by tracheotomy, and Mr. Chevalier another. After the operation in this

case—"Air was fully inspired through the opening; then a strong cough took place, by which a large quantity of viscid reddish mucus was forced out by the natural channel, through the glottis. It was evident the child did not expectorate before, simply because it could not sufficiently fill its lungs with air to drive the collected mucus out." *Watson.*

Notwithstanding these and many other favorable results, great opposition is made to the operation in this affection, by a great number of authoritative writers. Thus, Dr. Williams, in *Tweedie's Library* (edition of 1841, and before Trousseau's cases) said, "It is not necessary to discuss the question of the propriety of resorting to tracheotomy in croup." Pelletan, with whom bronchotomy was a favorite operation, says, it is useless in croup; Dr. Cheyne and Mr. Porter were of the same opinion. Liston says it is not often admissable. Watson rather halts between two opinions; for he remarks: "Tracheotomy has again and again been practiced in this complaint to no purpose; and I should be inclined to look upon it as absolutely hopeless, but for two instances of its successful performance, recorded in the *Medico-Chirurgical Transactions.*" And further on he states, that it affords a bad chance at the best; but it affords, also, in many cases, the *only* chance."

The evidence is now, I think, sufficiently great to place tracheotomy among the safe and proper means of treating this formidable disorder: If at all needed, it should be done without delay—before the vital powers are brought down by excessive lowering treatment, and before venous blood begins to circulate in the brain, and effusion has taken place in that organ and in the lungs. The discredit into which the operation has fallen is in consequence of its having been employed in the last stages of the disease. The disposition, however, to postpone the performance of the operation must ever continue very great among the mass of physicians; for, many bad cases of croup recover under the ordinary, and, as is supposed, milder methods of treatment. In the first stage, while active antiphlogistic remedies are likely to afford relief, much hesitation will be felt before proposing the operation; and, yet, that is the period at which it best succeeds.

In conclusion, I will say, that was one of my children affected by the disease, and were remedies not even holding it in check, I should, without waiting the approaches of death, proceed to open the trachea. But should I not see the case until in the last stage, I would still operate, unless the child was *in articulo mortis.*

15th. Epilepsy. The last disease in which tracheotomy has been advised is *epilepsy.* The proposal is from Dr. Marshall Hall, whose fame was already connected with the operation—he having

been the first to publicly second Dr. Wallace in his suggestion of it for the treatment of scalds of the glottis.

Dr. Hall says, "In whatever cases laryngeal phenomena are observed, the affection, when a mere symptom, must be termed *Laryngismus*. It is seen under various circumstances:—

"1. In apoplexy, after convulsion, in the effects of narcotic poisons, in the effects of intoxication, in deep sleep, it occurs in the form of *laryngeal stertor*, and may be distinguished as *apoplectic*.

"2. In epileptic, in puerperal convulsion, in the convulsive affections of infancy, as an effect of the poison of strychnia, in choking &c., it occurs in various forms of more or less sudden closure of the larynx, and may be distinguished as *spasmodic*."

This is Dr. Hall's theory: "Intermediately between the exciting *cause* of convulsion, and convulsion itself, *spasmodic laryngismus*, with more or less complete closure of the larynx, and violent expiatory efforts, intervenes, as an essential link in the chain of such cause and its direct effects, immediate and remote. Now in some cases the effect of such convulsion is fatal apoplexy; in others, paralysis; in others, mania; in others, especially, if the fit be repeated, loss of the faculties." "My proposition," he continues, "is to institute tracheotomy as a preventive measure." And his final conclusions are:

1. "That in cases of apoplexy, without organic disease, the patient ought not to be permitted to die without the institution of tracheotomy."

2. "That in cases of epilepsy, laryngismus with convulsion, and danger to life, mind, or limb, ought not to be permitted to continue without giving the patient the hope involved in the same operation."

Experience has thus far confirmed the theory; and the probability is great that many of the large class now afflicted with epilepsy, and to whom we have, haretofore, been able to hold out so little hope may find health and mind restored by this operation. If so, all honor to Marshall Hall! How many valuable lives! how many brilliant intellects! how much usefulness, and happiness, and beauty have been crushed out by this dread disorder! What a boon would it not be to prevent all or much of this! And if the theory be true—if the spirit of epilepsy stands, as it were, like some brutal jailer of a hideous dungeon, ready at the slightest provocation to shut up the portals to the lungs, and cut off the pure air of heaven—and so destroy its victim—why, then, if we cannot annihilate the fiend, we can at least circumvent him. While he commands nature's gate-way, we make but a little wicket below his position—and all his power is gone.

In Braithwaite, part 24, p. 67, the following case is related: A boatman had an extreme epileptic seizure, after which he was left in a state of deep apoleptic coma with asphyxia—inspiration being performed only by seldom and short catches, while the veins of the head and neck were everywhere visible and greatly distended. After the patient had remained in this state nineteen hours, Mr. Crane, acting on the suggestion of Dr. Hall, determined to perform tracheotomy. "Feeling convinced," Mr. Crane observes, "that the patient must shortly expire, and that the root of the evil was in the larynx, I at once proceeded to open the trachea. The relief was immediate: the air passed into the lungs; the spasm subsided, with the turgid condition of the head and neck, and the patient soon recovered his sensibility. This was not the only gratifying result: The poor man has suffered his epileptic seizures in increasing violence for seven or eight years, and recently thrice a week. At the end of two months he had no return of the attacks—and subsequently (how long is not stated) he still continued free from them. The tube was all the while kept in the trachea."

In the London *Lancet* for December, 1852, Dr. Marshall Hall, speaking of this case, says: "I have always considered it as the most interesting and valuable in medicine; for life was preserved when threatened by the most imminent danger, and all subsequent attacks of the direst epilepsy have been prevented."

In the same number of the *Lancet*, Mr. W. J. Mackarsie reports a most interesting case of the disease relieved by tracheotomy: "Robert W———, aged forty, has suffered more or less from epilepsy for the last twenty years; he has been under the care of the most experienced of the faculty in Manchester and elsewhere, without deriving any benefit; he has, within the last two or three years, become much worse, having frequent fits almost every day, seldom passing two days without from two to three attacks; his mind latterly has been much impaired. Some months since, I ascertained from his wife all the symptoms, and every minutia connected with the case. When first attacked, evident symptoms of laryngismus are first observed and heard; he is then voilently thrown to the ground, and continues for some time in violent convulsions; but whenever he can *freely inspire*, the fits cease, leaving him in a comatose state for some hours; his face generally is of a dark-brown, congested appearance. His appetite is good, and all the secretions perfect, and were it not for the fits, he would enjoy good health. I recommended, as advised by Dr. M. Hall, of London, tracheotomy as holding out a fair chance of great relief, if not of a permanent cure. His friends consented, and on Tuesday, August 24th, I operated."

He then gives an account day by day of the patient. I will omit

all until the 30th, six days after the operation. "To-day much better; walks out, enjoys his food, sleeps well, and is now quite recovered excepting slight debility. He states he has not felt so well for many years. *He has had no return of the fits;* but he has had several symptoms, or rather, attempts of the fits to return, but they have only lasted for a few seconds. Had the opening in the trachea been closed, I have no doubt he would have had them as severely as ever. His faculties since the operation have much improved, and I believe, in time, he will so far be restored as to resume his usual occupation."

Mr. Mackarsie, in a letter to Dr. Hall, written in October, says, his patient still continues to improve in health of body and mind; that there have been frequent attempts at return of the fits—lasting for a few seconds only—but the opening in the trachea, acting as a safety-valve, thwarts them.

Has there ever been a more triumphant vindication of the truth of a *theory* by practice than these two cases make of Marshall Hall's? All honor to the great physiologist!

Respectfully,

ASBURY EVANS.